



Humboldt & Bonpland's Cactaceae in the herbaria at Paris and Berlin

Author: Leuenberger, Beat Ernst

Source: Willdenowia, 32(1) : 137-153

Published By: Botanic Garden and Botanical Museum Berlin (BGBM)

URL: <https://doi.org/10.3372/wi.32.32113>

BioOne Complete (complete.BioOne.org) is a full-text database of 200 subscribed and open-access titles in the biological, ecological, and environmental sciences published by nonprofit societies, associations, museums, institutions, and presses.

Your use of this PDF, the BioOne Complete website, and all posted and associated content indicates your acceptance of BioOne's Terms of Use, available at www.bioone.org/terms-of-use.

Usage of BioOne Complete content is strictly limited to personal, educational, and non - commercial use. Commercial inquiries or rights and permissions requests should be directed to the individual publisher as copyright holder.

BioOne sees sustainable scholarly publishing as an inherently collaborative enterprise connecting authors, nonprofit publishers, academic institutions, research libraries, and research funders in the common goal of maximizing access to critical research.

BEAT ERNST LEUENBERGER

Humboldt & Bonpland's *Cactaceae* in the herbaria at Paris and Berlin

Abstract

Leuenberger, B. E.: Humboldt & Bonpland's *Cactaceae* in the herbaria at Paris and Berlin. – Willdenowia 32: 137-153. 2002. – ISSN 0511-9618.

Cactaceae specimens collected by Humboldt & Bonpland in tropical America and kept in the herbaria at Paris and in the Willdenow herbarium at Berlin are listed and discussed. Of the 15 taxa treated by Kunth, in 1823, in “Nova genera et species plantarum”, ten specimens from Venezuela, Colombia, Ecuador and Peru are extant in the Humboldt & Bonpland collection at Paris (P-Bonpl). The general herbarium at Paris contains duplicates of three of these and an additional specimen under a name not treated by Kunth. Of the eight specimens in the Willdenow herbarium at Berlin (B-W) attributed to Humboldt & Bonpland, six belong to taxa described as new by Kunth. Three of these were filed under unpublished names. The specimens and protologues are compared with Humboldt & Bonpland's unpublished field notes (“Journal botanique”). The nature of the material, its identification, and taxonomic and nomenclatural problems are briefly treated and the results summarized in tabular form.

Introduction

Fifteen species of *Cactaceae* (as “*Opuntiaceae*”) were treated by Kunth (1823), based on collections and observations of Humboldt and Bonpland from Venezuela, Colombia, Ecuador and Peru. All were published under the Linnean generic name *Cactus*, but a reference to alternative generic placements was given in parentheses after the genus name (Table 1). Thirteen taxa were new to science and marked with the symbol † after the name. Two were treated as already known species, *Cactus pendulus* Sw. and *C. triangularis* Jacq., the latter with question mark and an additional reference “Sp. pl. ed. W[illdenow] 2, p. 942”. Herbarium material is located at Paris (P-Bonpl and P) and in the Willdenow Herbarium at Berlin (B-W), herbarium acronyms according to Holmgren & al. (1990).

In *Cactaceae*, the “mss numbers” found with Humboldt & Bonpland specimens in the herbarium P-Bonpl, P and B-W correspond to a number given to each collected or observed specimen

Table 1. *Cactaceae* treated by Kunth (1823). – Herbarium material and original notes by Humboldt & Bonpland in their “Journal botanique” (MS) archived in Paris and page number there as indicated [or inferred]; the page number stamped on back of the page in the copy at B is added in parentheses.

Name as listed by Kunth (1823) Page reference (Kunth 1823) Source of information	Material at P-Bonpl, P and B-W	Number and name in MS Author of note MS page reference (page no. in copy at B)
<i>Cactus (Pereskea) bleo</i> † Nov. Gen. Sp. 6: 69. —	P-Bonpl, P, B-W	1546 <i>Cactus bleo</i> Bonpland MS1334: [145] (150)
<i>Cactus (Opuntia) bonplandii</i> † Nov. Gen. Sp. 6: 69. (“Bonpl. mss.” and “Humb.”).	—	3281 <i>Cactus cochenilifer</i> Bonpland MS53: 124 (123)
<i>Cactus (Cereus) caripensis</i> † Nov. Gen. Sp. 6: 66. —	P-Bonpl, B-W	1249 <i>Cactus pilosus</i> n. sp. Bonpland MS1334: [11] (12)
<i>Cactus (Cereus) chlorocarpus</i> † Nov. Gen. Sp. 6: 67. (“Humb. mss.”).	—	3549 <i>Cactus</i> Humboldt MS53: 202 (203)
<i>Cactus (Pereskea?) horridus</i> † Nov. Gen. Sp. 6: 70. (Desc. fl. fructibus ex sched. Bonplandii).	P-Bonpl, P, B-W	3594 <i>Cactus</i> Bonpland MS53: 214 (215)
<i>Cactus (Cereus) humboldtii</i> † Nov. Gen. Sp. 6: 66. (“Humb. mss.”).	P-Bonpl	3556 <i>Cactus</i> Humboldt MS53: 204 (205)
<i>Cactus (Cereus) icosagonus</i> † Nov. Gen. Sp. 6: 67. (“Bonpl. mss.”).	P-Bonpl, B-W	3293 <i>Cactus</i> Bonpland MS53: [129] (128)
<i>Cactus (Cereus?) laetus</i> † Nov. Gen. Sp. 6: 68. (“Humb. mss.”).	—	3552 <i>Cactus</i> Humboldt MS 53: 203 (204)
<i>Cactus (Cereus) lanatus</i> † Nov. Gen. Sp. 6: 68. (Desc. ex sched. Humb.” and “Humb.”).	—	3548 <i>Cactus lanatus</i> Humboldt MS53: 202 (203), 203 (204)
<i>Cactus (Rhipsalis?) micranthus</i> † Nov. Gen. Sp. 6: 65. (“Bonpl. mss.”).	P-Bonpl, P, B-W	3494 <i>Cactus</i> Bonpland MS53: [187] (189)
<i>Cactus (Cereus?) nanus</i> † Nov. Gen. Sp. 6: 68. —	—	3553 <i>Cactus nanus</i> Humboldt MS53: 203 (204)
<i>Cactus (Rhipsalis) pendulus</i> Sw. Nov. Gen. Sp. 6: 65. (... descr. floris ex schedis Bonplandianis ...).	P-Bonpl, B-W	1538 <i>Cactus parasiticus?</i> <i>Cactus pendulus</i> Bonpland MS1334: [140] (145)
—	P, B-W	1445 <i>Cactus phyllanthus</i> Bonpland MS1334: [91-92] (91-92)
<i>Cactus (Cereus) sepium</i> † Nov. Gen. Sp. 6: 66. (“Bonpl. mss.”).	P-Bonpl, (B-W)	3216 <i>Cactus</i> Bonpland MS53: [97] 96

continued on next page

<i>Cactus (Cereus?) serpens</i> †	P-Bonpl	3550 <i>Cactus</i>
Nov. Gen. Sp. 6: 68		Bonpland (& Humboldt)
("Bonpl. mss.")		MS53: 202-203 (203-204)

in Humboldt & Bonpland's field book, the "Journal botanique"¹. This number was not cited by Kunth (1823). The field books are extant in the Bibliothèque Centrale du Muséum National d'Histoire Naturelle, Paris (Lourteig 1977), a recent copy is at B (Lack 2001, pers. comm. and in prep.). General information on the Humboldt & Bonpland collections was provided by Stearn (1968). New evidence on field notes and numbers as well as on labels of Humboldt & Bonpland collections of *Polygalaceae* at B-W and P-Bonpl has been published by Rankin & Greuter (2002).

Humboldt and Bonpland specimens at Paris

The ten specimens in the Humboldt and Bonpland collection at Paris (P-Bonpl) are labelled in Kunth's handwriting, with the name, collection number and locality. They are filed in the sequence as published by Kunth (1823); the sequential number is also indicated on the labels (Fig. 1, 4). Eight of the specimens at P-Bonpl are the nomenclatural (holo-)types of new names published by Kunth (1823). Three duplicates (isotypes) are extant in the general herbarium at Paris (P). All bear original labels with at least the number written by Bonpland (Fig. 2, 5), printed labels indicating the source as "Herbier de l'Amérique équatoriale, donné par M. A. Bonpland" and names and reference to Kunth (1823) inserted in a handwriting clearly different from that of Kunth (identification pending, Poncy, pers. comm. 25.1.2002). These specimens were thus probably among the duplicates taken to Argentina by Bonpland but returned to Paris in 1832, as reported by Hamy (1906: 105) and Krapovickas (1970: 235).

The general herbarium houses an additional specimen "*Humboldt mss. 1445*", labelled by Bonpland as "*Cactus phyllanthus*, avril 1801. Carthagène" and "Turbaco" added below (Fig. 7). This specimen has the same kind of printed label. However, "*Cactus*" and "Turbaco" are clearly added in Kunth's handwriting, which suggests that this specimen had remained at Paris but, due to doubt as to its identification, was not used for the "Nova genera et species" by Kunth (1823), where *Cactus phyllanthus* was not treated. The label bears the number providing the link to the field notes (Fig. 7, 9).

According to annotations on the sheets at P-Bonpl and P, the Humboldt & Bonpland material was studied by P. C. Hutchison and some by M. Kimmach around 1960. The specimens belonging to *Pereskia* were studied and cited by Leuenberger (1986). Probably due to the existence of the microfiche edition of the Humboldt & Bonpland herbarium (IDC 6202-2), the material at Paris does not seem to have been consulted directly in more recent studies, including Madsen (1989).

Humboldt and Bonpland specimens at Berlin

Eight specimens of a total of 28 *Cactaceae* in the Willdenow Herbarium can be attributed to collections of Humboldt and Bonpland. Some bear numbers and names in Bonpland's handwriting

¹ In the course of this study limited almost exclusively to pages containing *Cactaceae*, two cases were encountered where the same number was given to two different collections. One is "3494 *Cactus*" (described by Kunth as *Cactus micranthus*) with notes, and 3494 *Coccoloba gracilis*, number and name only inserted at the margin, no notes (MS53:[187]). In this context, it seems important to point out that there is a subsequent entry "3498 *Coccoloba gracilis*" with descriptive notes (MS53: [189]). A specimen marked as type of *C. gracilis* Kunth bearing this number is extant at P, not P-Bonpl (O. Poncy, pers. comm. 12. 2001). The second case is in the same number series: 3496 *Tillandsia* and 3496 *Cordia* (MS53: 188), both with descriptive notes.

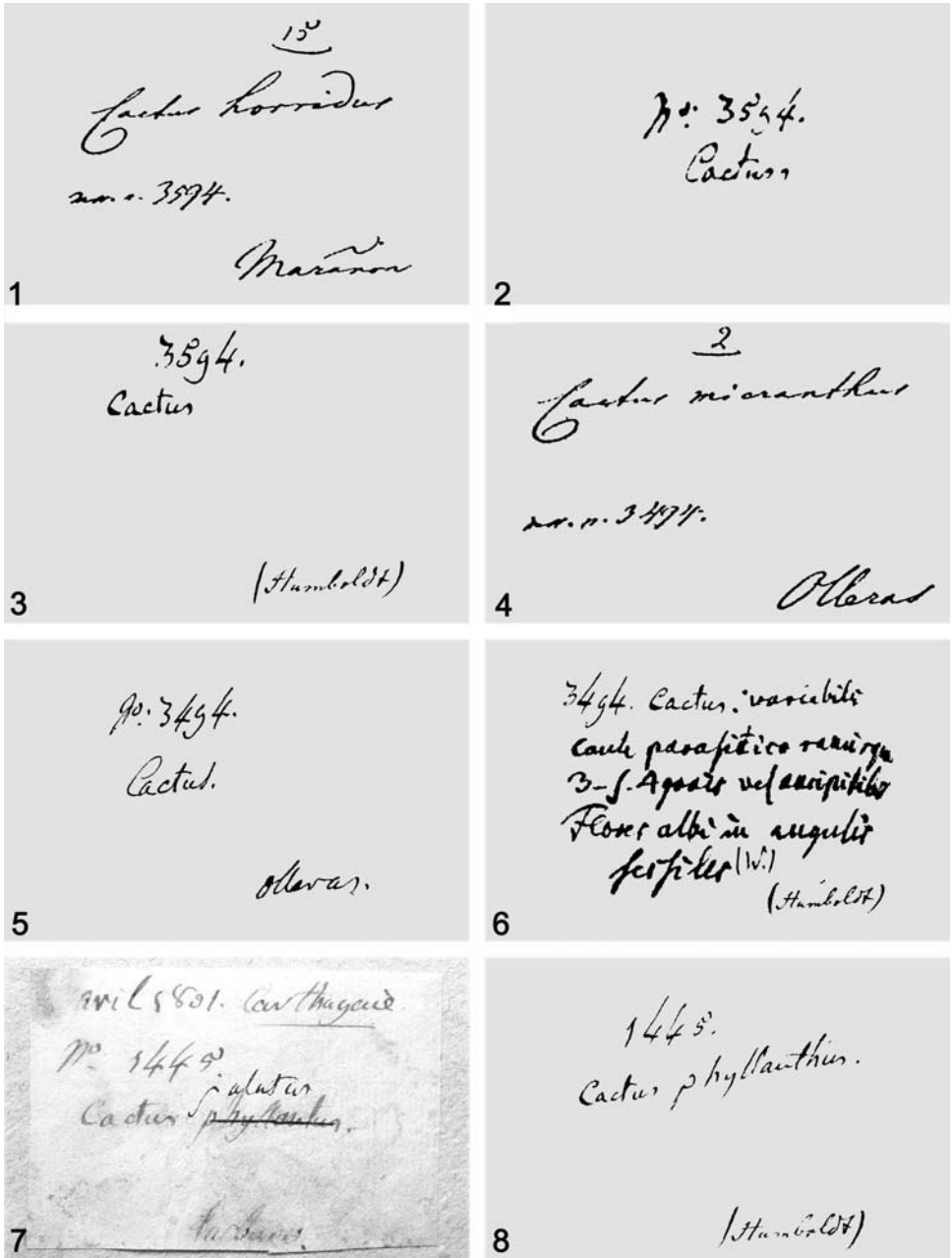


Fig. 1-8. Handwriting samples on labels (1-2, 4-7) and sheets (3, 8) of *Cactaceae* specimens, collected by Humboldt & Bonpland, at P-Bonpl (1, 4), in the general herbarium at P (2, 5, 7) and at B-W (3, 6, 8). – Hand associated with Kunth (1, 4), Bonpland (2; lines 1 and 2 in 3 and 8; lines 1 and 3 in 5; first part of line 1 in 6, 7), Willdenow (last part of line 1 to line 5 in 6) and Schlechtendal (line 3 in 3 and 8, line 6 in 6). – 1-3: *Pereskia horrida* (*Cactus horridus*), 1 at P-Bonpl, 2 at P, 3 B-W 9441; 4-6: *Rhipsalis micrantha* (*Cactus micranthus*, *C. variabilis* nom. nud.), 4 at P-Bonpl, 5 at P, 6 B-W 9433; 7-8: *Disocactus amazonicus* (“*Cactus phyllanthus*”), 7 at P, 8 at B-W 9440-2.

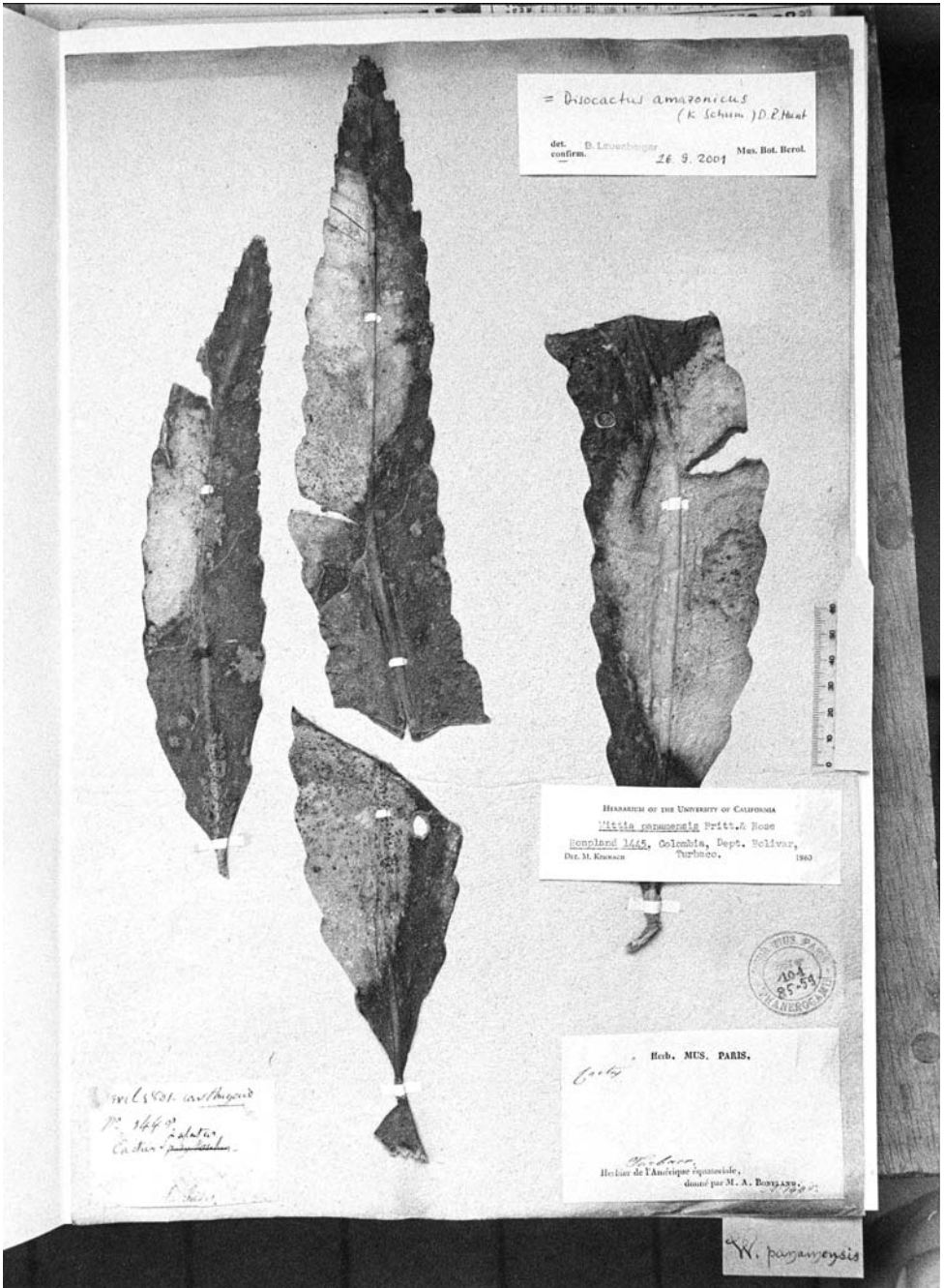


Fig. 9. *Disocactus amazonicus*, specimen Humboldt & Bonpland 1445 at P.

(Fig. 3, 6, 8). The annotation "(Humboldt)" referring to the collector was added by D. F. L. von Schlechtendal (Hiepko 1972). Others have no number or locality data at all but were marked by Schlechtendal in the lower right corner of the sheet with "Humboldt", indicating that Willdenow had received the material from Humboldt (Hiepko 1972, Rankin & Greuter 2002: 1240, fig. 3). Seven specimens belong to *Cactaceae* described by Kunth (1823), but it has to be stressed that the Berlin duplicates were not available to Kunth for the preparation of the descriptions (McVaugh 1955). A comparison with the material at Paris shows that three specimens at Berlin even bear different and unpublished names. Two of these (*Cactus pilosus* and *C. variabilis*) have the same Humboldt mss. number as specimens in Paris under published names. The third one, *Cactus endecagonus*, has no data at all but can be linked to the published name *Cactus sepium* through the descriptive element of the epithet *endecagonus* (= eleven-angled), which apparently relates to *C. sepium* Kunth, the only species where 11 ribs are specifically mentioned in the notes and in the protologue.

The specimen under the name *Cactus phyllanthus*, "Humboldt mss. 1445", without locality data at B-W, is a duplicate of the material in the general herbarium at Paris, where it is accompanied by locality data (Fig. 7, 8, 9).

The *Cactaceae* specimens in the Willdenow herbarium have apparently not been considered in revisions of genera of *Cactaceae* with the exception of *Pereskia* (Leuenberger 1986).

The specimens extant in at least one of the herbaria are discussed below and listed in Table 2.

Humboldt and Bonpland's field notes

Humboldt's and Bonpland's botanical field notes ("Journal botanique") are archived in the Central Library of the Natural History Museum at Paris (Lourteig 1977, Lack 2001). A copy is now extant in the library at B. The notebooks MS1334, MS 2534 and MS53 contain numbers referring to *Cactaceae*.

The numbered entries, with very rare exceptions one number per collection or observation, are without date. They are written in Latin, sometimes with French comments. Most are written by Bonpland, sometimes with marginal notes added by Humboldt. Others are in Humboldt's pen, in Latin or partly in French (Fig. 10).

Comparison of the notes with the descriptions published by Kunth (1823) shows that Kunth used the notes almost textually for the detailed description, with minor modifications, particularly in sequence of characters and terms used (e.g., spinae instead of aculei, crebri instead of numerosi, ovarium instead of germen, uni- instead of mono-, sometimes anguli instead of costae).

The short diagnosis preceding Kunth's published description was extracted by Kunth from the notes. In *Cactaceae*, Kunth used the herbarium material in few cases only exclusively or substantially to prepare or complement the descriptions, e.g., in *Cactus caripensis*, *C. pendulus* (not a new species), *Cactus sepium* and *Cactus horridus*.

New names proposed by Humboldt and Bonpland in the manuscript were usually respected by Kunth, e.g., *Cactus bleo*, *C. lanatus* and *C. nanus*. One exception, *Cactus caripensis* instead of *C. pilosus* (in Bonpland's handwriting), is noteworthy. The change of name by Kunth can be attributed to the fact that the duplicate at B-W (not seen by Kunth) bears the original name *C. pilosus*.

The comments made below are based on a comparison of the notes with the published text and refer mainly to differences or additional information supporting or questioning later taxonomic treatments or identifications.

Notes on specimens, protologues and field notes by Humboldt and Bonpland

The taxa are listed under the names used by Kunth (1823).

- a) Notes on specimens
- b) Comparison of field notes with protologue
- c) Observations and conclusions

Cactus bleo

- a) The material at P consists of 2 leaves, 7 tepals (petaloids/sepaloids) and receptacle of flower; the isotype sheet in the general herbarium contains 6 leaves. One leaf and one petaloid only at B-W.
- b) Minor differences in sequence and terminology between Bonpland's notes under "1546. *Cactus bleo*" and the published description. In the note, the flowers are "subsessile", in Kunth's description "shortly pedunculate". The note that the crushed flowers are used for clarification of water was added by Bonpland in French.
- c) The species was discussed in detail under *Pereskia bleo* (Kunth) DC. by Leuenberger (1986, 1987).

Cactus bonplandii

- a) No herbarium material known.
- b) Bonpland's note referring here can be found under the entry "3281. *Cactus cochenilifer*. *Cochinilla*.". Humboldt and Bonpland's identification was listed by Kunth (1923) as "*Cactus coccinellifer*. Bonpland mss. *Cochinilla incolis*." under the newly proposed name *Cactus bonplandii*. The orthography "*coccinellifer*" used by Kunth agrees with Willdenow (1799). Bonpland's note is complemented by a marginal remark written by Humboldt. The notes agree with the published description but contain an interesting additional observation by Bonpland on the way how, in all cacti observed, the "monopetalous" corolla and stamens united to it by a membrane detach as one entity after flowering.
- c) Identification of the plant based on the notes and published description is difficult in the absence of herbarium material. It is certainly not *Opuntia cochenillifera* (L.) Mill. and was discussed by Madsen (1989) as a putative hybrid of *O. ficus-indica* (L.) Mill., based on observations of such populations in southern Ecuador. The numerous, flattened, yellow spines and thickened style point to a plant similar to *Opuntia soederstromiana* Britton & Rose, but the descriptions by Bonpland and Kunth lack details of stem size and shape of the flower to ascertain this. Britton & Rose (1919), Hunt (1999) and Anderson (2001) accept *Opuntia bonplandii* (Kunth) F. A. C. Weber for Ecuador. Comparison with *Opuntia* material from Cuenca, the type locality of *Cactus bonplandii*, might provide further evidence.

Cactus caripensis

- a) The specimens at P-Bonpl and B-W are small, entire plants in juvenile stage, with roots and bristly stems. They can be identified as juvenile *Rhipsalis baccifera* (J. S. Mueller) Stearn.
- b) Name (as "1249 *C. pilosus* n. sp.") and habitat only mentioned under no. 1249 in note by Bonpland. The description by Kunth appears to be based entirely on the herbarium material.
- c) The epithet "*caripensis*" was apparently chosen by Kunth (1823). Trujillo (1997) also placed *Cactus caripensis* in the synonymy of *Rhipsalis baccifera*.

Cactus chlorocarpus

- a) No herbarium material known.
- b) The short note by Humboldt as "3549. *Cactus*" was transcribed by Kunth textually with minor differences in terminology.
- c) The interpretation is not controversial thanks to the description and fruit characters, fitting with only one species occurring between Huancabamba and Sondorillo. The current name is *Browningia chlorocarpa* (Kunth) W. T. Marshall (Hunt 1999); see also Table 2. Neotypification with material from the type locality would be advisable.

Cactus horridus

- a) Twig with spines and three leaves at P-Bonpl; four twigs on the isotype sheet in the general herbarium (P). The epidermis of all stems is glabrous.

b) Bonpland's note is shorter than the published description but contains information on angulate, glossy, naked seeds not used by Kunth. Bonpland noted "2-5 red flowers in the axils of the leaves, intermixed with the spines, sessile". Kunth transcribed this as "flowers above axillary spines, geminate to quinate, pedunculate". This contradiction is compatible with a possible difference in living and dry material, where the axillary clusters of flowers may appear very shortly pedunculate. The epithet was apparently provided by Kunth.

c) For a discussion of characters of the species and varieties see Leuenberger (1986) under *Pereskia humboldtii* Britton & Rose. The correct name is *P. horrida* DC., as pointed out by Brako & Zarucchi (1993).

Cactus humboldtii

a) At P-Bonpl, fragment of a flower only, upper part, very long hairy and similar to the specimen of *C. sepium* in P.

b) There are minor differences between the notes by Humboldt (as 3556 *Cactus procumbens, humifusus, cylindricus...*) and the published description of the shape of the scales of the flower tube ("squamis oblongo acutis" vs. "squamis lanceolatis, acuto-mucronatis"). Stem characters ("costis subtuberculatis") were modified by Kunth to "angulis tuberculosis" in the diagnosis but textually copied ("costis subtuberculatis") in the description below. The epithet was apparently provided by Kunth.

c) *Cactus humboldtii* is currently listed in the synonymy of *Cleistocactus icosagonus* (Kunth) F. A. C. Weber (see Hunt 1999), probably because Kunth (1823), under *Cactus icosagonus*, expressed doubts if the two species were sufficiently distinct. Ritter (1981) maintained *C. humboldtii* as a separate species: *Borzicactus humboldtii* (Kunth) Britton & Rose. The type material is hardly sufficient for a safe comparison. Material of unknown origin in cultivation, originally accessioned as "*Seticereus humboldtii*" at Berlin-Dahlem, differs from *C. icosagonus* by reddish-brown spines and lower rib number and coincides well with the concept of Ritter (1981). Seeds of *Cereus humboldtii* from unknown sources other than Ritter were distributed by the Winter company according to the seed catalogues (Winter 1955, 1956). According to Ritter (1981), there is material in cultivation introduced by Backeberg from the Huancabamba valley, illustrated by Werdermann (1937: pl. 133) under the name *Borzicactus plagiostoma* (Vaupel) Britton & Rose. The illustration agrees with the plant currently cultivated at Berlin-Dahlem as *B. humboldtii*, but the true *Cleistocactus plagiostoma* (Vaupel) D. Hunt (\equiv *Cereus plagiostoma* Vaupel) from farther south (San Miguel, Depto. Cajamarca, holotype at B alc) seems different. The plant illustrated by Rauh (1958: 325, fig. 157III-IV) as *Seticereus humboldtii* is more similar to *C. icosagonus* but was stated to differ by reddish brown spines and purple (not yellow) filaments. The plant illustrated by Rowley (2000: 208, fig. 5) as *Cleistocactus icosagonus* (*humboldtii*) has almost naked flowers with red filaments.

Material from the type locality is needed to determine the correct application of the name and more material is needed for a clear circumscription of this and allied taxa. An epitype should be designated once the application of the name is established.

Cactus icosagonus

a) At P-Bonpl and B-W one flower each (only 3.2-3.5 cm long, at late stage of anthesis, not well preserved) and flower buds (c. 2 resp. 1.5 cm long), all densely brown-hairy.

b) The notes agree with the published description with minor differences in wording. Bonpland noted not only the long white hairs of the flower tube but repeated that the flowers were very hairy ("hirsutissimis"), which was omitted by Kunth but agrees with the herbarium material. The notes do not contain the epithet, but "*icosagonus*" chosen by Kunth agrees with the twenty angles mentioned in the original notes and this element also occurs in Willdenow's wording "Cactus icosagonus repens ramis vigintiangularibus spinis pilis intermixtis" on the label on the folder at B-W. Vegetative material is absent in both herbaria. Whence Willdenow obtained this informa-

tion remains in doubt. In particular, the spines intermixed with hairs, a characteristic feature of flower-bearing stem parts of *Cleistocactus icosagonus*, are not mentioned explicitly in Bonpland's original notes.

c) The material is difficult to compare with *Cleistocactus icosagonus* in the widely adopted sense and circumscription of Madsen (1989), where the flowers are described as 6-8 cm long and the flower tube with white or brown hairs. Doubts as to the circumscription of this species are also expressed by Rowley (2000) who illustrates four different specimens under this name. Only one of these (*Madsen 50225*, from La Toma-Loja, Ecuador) has flowers similarly hairy as the type and agrees perfectly in filament colour (white, with red tips). Specimens of unknown origin in cultivation at Berlin-Dahlem have flowers with less hairy tube but filament colour agreeing with the protologue. The circumscription of the species needs further study. Analysis of variation is necessary on the basis of documented material, and designation of an epitype may be advisable.

Cactus laetus

a) No herbarium material known.

b) "3552. *Cactus erectus laete (albo) virescens, articulatus*". The very short note by Humboldt, partly in French, was textually used and translated by Kunth with minor differences in terminology. The note on a possible affinity with *Cereus heptagonus* is not in the notes but was apparently added by Kunth, as was the epithet.

c) The application of the name to the genus *Armatocereus*, as *A. laetus* (Kunth) Backeberg, is not controversial, but the circumscription of the species (including or excluding *Armatocereus matucanensis*) needs further study. Neotypification with material from the type locality (Sondorillo in Peru) would be advisable.

Cactus lanatus

a) No herbarium material known.

b) For this collection number, two entries with the number "3548. *Cactus lanatus*" exist, both by Humboldt, the second inserted after no. 3551. The second one is partly in French with details on the woolly flowering zone and includes a sketchy drawing of a stem transection showing the deep ingrooving of the woolly flowering zone (cephalium).

c) The correct name is *Espostoa lanata* (Kunth) Britton & Rose. Neotypification with material from the type locality would be advisable.

Cactus micranthus

a) Two twigs (6 stem segments), the isotype in the general herbarium has two twigs (a total of ten stem segments). Four stem segments at B-W, with number "3494" on label surely and "*Cactus*" probably, written by Bonpland, "*variabilis*" added by Willdenow (Fig. 6).

b) The entry "3494. *Cactus*" is by Bonpland with a very brief description, textually used by Kunth (1823). Below the number and name, a marginal second entry "3494 *Coccoloba gracilis*" is added in the same handwriting, without further notes. Besides the extant specimen of *Cactus micranthus* with this number at P-Bonpl and the duplicate with the same number under the name *C. variabilis* at B-W, there is a specimen under *Coccoloba gracilis* at B-W 7701, lacking label data and number, but with source indicated as "Humboldt" by Schlechtendal in the lower right corner of the sheet.

According to the microfiche edition of the Humboldt & Bonpland herbarium (IDC 6202-2, fiche 43), there is no material of *Coccoloba gracilis* under this number at P-Bonpl. However, according to O. Poncy (pers. comm.), there is material under the same name in the general herbarium bearing the number 3498 and marked as type of *Coccoloba gracilis* Kunth (Kunth 1817: 176). This agrees with the number and note in the journal botanique (MS53: 188). The material at B can thus belong to either number 3494 or 3498, if 3494 really represents a collection and is not

just a marginal memory note substituted by 3498. The specimen is probably part of a large set given by Humboldt to Willdenow (Stearn 1968: 41).

c) The current name is *Rhipsalis micrantha* (Kunth) DC. This widespread and complex taxon was studied in detail by Barthlott (1974). The specimens at P-Bonpl, P and B-W were not cited.

Cactus nanus

a) No herbarium material known.

b) 3553. *Cactus nanus*. The epithet was provided by Humboldt and the brief description is by Humboldt, with an added comment in French referring to the nuisance this inconspicuous plant causes to man and animals who step on it.

c) This creeping species with indicated origin “near Sondorillo and Huancabamba” is not the same as *Opuntia nana* Vis., hence the new name *O. pestifer* proposed by Britton & Rose (1919). *O. pubescens* H. L. Wendl. ex Pfeiff. (Pfeiffer 1837) is generally accepted as the older, correct name for the same species (Hunt 1999). Crook & Mottram (2001) postulate *O. pubescens* to be the same as *O. tomentosa* Salm (1822), but this does not seem probable from the protologues. Pfeiffer (1837) gave the origin of *O. tomentosa* vaguely as tropical America, but the name is in long-established use for a Mexican species fitting well the original description of an erect, flat-stemmed plant with much larger stem segments than the low growing *O. pubescens*.

Cactus pendulus Sw.

a) Not type material. At P-Bonpl, there are ten stem segments and six fruits, at B-W only stem segments. The label at B-W bears a number (1538) written by Bonpland.

b) The original entry “1538. *Cactus parasiticus?*” was corrected to *Cactus pendulus*. Bonpland notes that this species was frequent in mountain areas in Venezuela but not observed along the Orinoco. The note is shorter than the description by Kunth (1823), who appears to have described fruit and seed characters from the herbarium specimen.

c) The correct name is *Rhipsalis baccifera* (J. S. Muell.) Stearn, see Table 2.

Cactus phyllanthus

a) Not type material. No material in the Humboldt & Bonpland collection, but specimens under this name present at P and B-W. The original epithet on the label at P is crossed out and replaced by “*alatus*”, apparently by Bonpland (Fig. 7, 9). The identification as *Cactus alatus*, a species from Jamaica now classified as *Pseudorhipsalis alata* (Sw.) Britton & Rose, is incorrect. Later on, Kunth only labelled it as *Cactus*. Even without flowers, the specimen no. 1445 from Turbaco, Colombia, can be recognized as belonging to a different genus and species described much later by Schumann (1903) as *Wittia amazonica* and currently classified as *Disocactus amazonicus* (K. Schum.) D. R. Hunt (Hunt 1982, 1999). The material at P had been correctly recognized and annotated by M. Kimnach in 1960 as *Wittia panamensis* Britton & Rose, now a synonym of the former name (Fig. 9). The four representative pieces of stem at P and the single stem segment at B-W are typical of *Disocactus amazonicus* (K. Schum.) D. R. Hunt.

b) The detailed note written by Bonpland on no. “1445. *Cactus Phyllanthus*” surprisingly contains details on flower characters, whereas flowers are not extant in the herbarium specimens at B-W and P. The note mentions red tubular flowers, and an addition by Bonpland in French near the end points out that the outer perianth segments were violet (“les folioles exterieures du calyce sont plus violetes que les interieures”). This fully confirms the identification of the sterile herbarium material as *Disocactus amazonicus* discussed above. The locality and year are given as Turbaco, 1801, flowering in April.

c) *Cactus phyllanthus* was not treated by Kunth (1823) but is a name mentioned in Humboldt’s diaries from Colombia, between Hato del Quemado and Pandi (Faak 1986: 122), and from Venezuela (Faak 2000: 284). This taxon is now classified as *Epiphyllum phyllanthus* (L.) Haw. There can be little doubt that Humboldt and Bonpland saw this species as well, but the collected material all belongs to *Disocactus amazonicus* (K. Schum.) D. R. Hunt.

Cactus sepium

- a) At P-Bonpl, one flower, 5 cm long, very hairy, not widely opening, style slightly protruding. Compatible with the current concept of *Cleistocactus sepium* from Ecuador (Madsen 1989). The flower in B-W under the unpublished name *Cactus endecagonus* (B-W 9423) is identical with the material at P-Bonpl but is mounted upside-down and has no original label. The epithet and short description on the folder were written by Willdenow, the name in the upper right corner of the sheet and the source indication "Humboldt" by Schlechtendal.
- b) "3216. *Cactus* caulis orygalis et plus erectus undecim angular ..." was provided by Bonpland with a short description only and a longer comment in French on the habitat and use as medicine. The epithet and greater part of the published description referring to flower characters was provided by Kunth. Kunth's doubt if this was the same as *C. humboldtii* is apparently based on the similar flower fragment in the herbarium but needs to be taken with some reservation.
- c) *Cleistocactus sepium* (Kunth) F. A. C. Weber. The unpublished name *Cactus endecagonus* proposed by Willdenow at B-W can be linked with *Cactus sepium* only through the descriptive element of the epithet (*endecagonus* = eleven-angled). *Cactus sepium* is the only species where 11 ribs are specifically mentioned in Bonpland and Humboldt's notes. Since the material consists of a flower only, it seems that Willdenow must have had access to these notes.

Cactus serpens

- a) One flower in rather poor state of conservation, 5.4 cm long, longitudinally split in the upper part, limb narrow, style slightly protruding, tube not conspicuously hairy. The flower is compatible neither with *Borzicactella serpens* of Ritter (1981) nor with *Cleistocactus serpens* in the sense of Hunt (1999).
- b) The original entry is "3550. *Cactus*". Bonpland described the stem as "Cactus repens, sub angulat. ramos., articulat. areolis rhombis (hexangularibus) apice armatis, tessellatus. Seta et spina, cir cincta, numerosa. Seta pollicaria numerosa, spinae 1-2-3. Setis duplo longior." Kunth's transcription of the spine arrangement ("Spinae 1-3 bipollicares, setis crebris dimidio brevioribus cinctae ...") is not textually but in content identical and describes the plant as having tessellate areoles with 1-3 central spines surrounded by numerous bristles half as long as the spines. This points to a plant of the habit of *Borzicactus neoroezlii*, not to the plant for which the name has been used from Backeberg (1931) onward.
- c) The controversial application of the name *Cactus serpens* and the elucidation of the taxonomy and nomenclature are subject of a separate paper on *Cleistocactus serpens* and related species (Leuenberger, in press).

Cactus triangularis

- a) Not type material. The specimen from Mahates, Colombia, contains only tepaloids, petaloids and a fragment of the flower tube. These belong most likely to a *Hylocereus* flower. The petaloids seem too broad for a *Selenicereus*, and the specimen lacks spiny areoles on the flower tube, which should be present in *Selenicereus* (particularly in *S. inermis*).
- b) Bonpland's note contains relevant additional information: petals erect, and diameter of the style 4 lin. (= 9 mm). The erect (inner) petals, the red base of the petals and the narrower inner petals are not compatible with *Hylocereus* but rather point to *Selenicereus inermis* (Otto ex Pfeiff.) Britton & Rose, a still little-known species reported from Venezuela and Colombia (Britton & Rose 1920, Hunt 1999).
- c) On geographical grounds, the collected and observed Humboldt & Bonpland plant cannot be *Hylocereus triangularis* (L.) Britton & Rose, a still insufficiently known taxon listed by Hunt (1999) from Jamaica, Cuba and the Dominican Republic. The fragmentary specimen from Colombia could belong to *H. polyrhizus* (F. A. C. Weber) Britton & Rose. However, the description

of the flower colour rather points to *Selenicereus inermis* (Otto ex Pfeiff.) Britton & Rose. The case remains unresolved but is nomenclaturally irrelevant. Kunth's doubts on the correct identification remain even now.

Index of Humboldt & Bonpland mss. numbers with reference to correct identification or currently accepted name, respectively

- 1249 *Rhipsalis baccifera* (J. S. Muell.) Stearn
 1445 *Disocactus amazonicus* (K. Schum.) D. R. Hunt
 1538 *Rhipsalis baccifera* (J. S. Muell.) Stearn
 1546 *Pereskia bleo* (Kunth) DC.
 1884 ?*Hylocereus polyrhizus* (F. A. C. Weber) Britton & Rose (material, but descr. pointing to *Selenicereus inermis* (Pfeiff.) Britton & Rose)
 3216 *Cleistocactus sepium* (Kunth) F. A. C. Weber
 3281 *Opuntia bonplandii* (Kunth) F. A. C. Weber
 3293 *Cleistocactus icosagonus* (Kunth) F. A. C. Weber
 3494 *Rhipsalis micrantha* (Kunth) DC.
 3548 *Espositoa lanata* (Kunth) Britton & Rose
 3549 *Browningia chlorocarpa* (Kunth) W. T. Marshall
 3550 *Cleistocactus serpens* (Kunth) F. A. C. Weber
 3552 *Armatocereus laetus* (Kunth) Backeb.
 3553 *Opuntia pubescens* Pfeiff.
 3556 *Cleistocactus humboldtii* (Kunth) F. A. C. Weber
 3594 *Pereskia horrida* DC.

Index of basionyms and manuscript names with reference to accepted names

- | | |
|--------------------------------|-----------------------------------------------------------------------------------------------------------------------------------|
| <i>Cactus bleo</i> | ≡ <i>Pereskia bleo</i> (Kunth) DC. |
| <i>Cactus bonplandii</i> | ≡ <i>Opuntia bonplandii</i> (Kunth) F. A. C. Weber |
| <i>Cactus caripensis</i> | = <i>Rhipsalis baccifera</i> (J. S. Muell.) Stearn |
| <i>Cactus endecagonus n.n.</i> | ≡ <i>Cleistocactus sepium</i> (Kunth) F. A. C. Weber |
| <i>Cactus chlorocarpus</i> | ≡ <i>Browningia chlorocarpa</i> (Kunth) W. T. Marshall |
| <i>Cactus "cochenilifer"</i> | = <i>Opuntia bonplandii</i> (Kunth) F. A. C. Weber |
| <i>Cactus horridus</i> | ≡ <i>Pereskia horrida</i> DC. |
| <i>Cactus humboldtii</i> | ≡ <i>Cleistocactus humboldtii</i> (Kunth) F. A. C. Weber |
| <i>Cactus icosagonus</i> | ≡ <i>Cleistocactus icosagonus</i> (Kunth) F. A. C. Weber |
| <i>Cactus laetus</i> | ≡ <i>Armatocereus laetus</i> (Kunth) Backeb. |
| <i>Cactus lanatus</i> | ≡ <i>Espositoa lanata</i> (Kunth) Britton & Rose |
| <i>Cactus micranthus</i> | ≡ <i>Rhipsalis micrantha</i> (Kunth) DC. |
| <i>Cactus nanus</i> | = <i>Opuntia pubescens</i> Pfeiff. |
| <i>Cactus pendulus</i> | = <i>Rhipsalis baccifera</i> (J. S. Muell.) Stearn |
| <i>Cactus pilosus n.n.</i> | ≡ <i>Rhipsalis baccifera</i> (J. S. Muell.) Stearn |
| <i>Cactus sepium</i> | ≡ <i>Cleistocactus sepium</i> (Kunth) F. A. C. Weber |
| <i>Cactus serpens</i> | ≡ <i>Cleistocactus serpens</i> (Kunth) F. A. C. Weber |
| <i>Cactus triangularis(?)</i> | = <i>Hylocereus polyrhizus</i> (F. A. C. Weber) Britton & Rose or
<i>Selenicereus inermis</i> (Otto ex Pfeiff.) Britton & Rose |

Table 2. Humboldt & Bonpland's *Cactaceae* specimens at Paris, general herbarium (P) and Humboldt & Bonpland herbarium (P-Bonpl), and Berlin, Willdenow herbarium (B-W), listed in alphabetical order.

*Specimen in P-Bonpl (Cact. no. as in Kunth 1823) / P	*Specimen in B-W, no.	*Name according to Kunth (1823)
*Name on label	*Name on folder and sheet	*Nov. Gen. Sp. page reference
—	*Name on original label	*Origin
*Humb. & Bonp. mss. no.	“mss no.” [collector] and/or [source]	*Accepted name (or correct identification where applicable)
*Locality	*Locality	*Synonyms
*Type status (material)	*Type status (material)	
P-Bonpl (14) / P <i>Cactus bleo</i> —	B-W 9442 <i>Cactus bleo</i> <i>Cactus bleo</i>	<i>Cactus bleo</i> Kunth 6: 69 (Colombia): in ripa fluminis Magdalenae prope Badillas
1546	— [Humboldt]	<i>Pereskia bleo</i> (Kunth) DC.
Rio Magdalena (Badillas)	—	≡ <i>Rhodocactus bleo</i> (Kunth) F. Knuth
Holotype / isotype (leaves and flower parts)	Isotype (one leaf and one petaloid)	
P-Bonpl (4) / — <i>Cactus caripensis</i> —	B-W 9431 <i>Cactus pilosus</i> “ <i>Cactus</i> sp. nov.”	<i>Cactus caripensis</i> Kunth 6: 66 (Venezuela): prope Caripe
1249	1249 “(Humboldt)” [Humboldt]	<i>Rhipsalis baccifera</i> (J. S. Muell.) Stearn
Caripe	Cumana, in lignis ... Caripe	
Holotype (juvenile stems)	Isotype (juvenile stems)	
P-Bonpl (15) / P <i>Cactus horridus</i> —	B-W 9441 <i>Cactus horridus</i> <i>Cactus</i>	<i>Cactus horridus</i> Kunth 6: 70 (Peru): ad flumen Marañón, Provinciae de Jaén de Bracamoros
3594	3594 “(Humboldt)” [Humboldt]	<i>Pereskia horrida</i> DC. = <i>Pereskia humboldtii</i> Britton & Rose
Marañón	—	
Holotype / isotype (twigs and leaves)	Isotype (3 twigs and one leaf)	
P-Bonpl (5) / — <i>Cactus humboldtii</i> —	— — —	<i>Cactus humboldtii</i> Kunth 6: 66 (Peru): inter pagos Sondorillo et San Felipe
3556	—	<i>Cleistocactus humboldtii</i> (Kunth) F. A. C. Weber
S. Felipe	—	= <i>Borzicactus humboldtii</i> (Kunth) Britton & Rose
Holotype (fragment of flower only)	—	= <i>Matucana humboldtii</i> (Kunth) F. Buxb.
P-Bonpl (6) / — <i>Cactus icosagonus</i> —	B-W 9429 <i>Cactus icosagonus</i> —	<i>Cactus icosagonus</i> Kunth 6: 67 (Ecuador): prope pagum Nabón
3293	— [Humboldt]	<i>Cleistocactus icosagonus</i> (Kunth) F. A. C. Weber
Nabon	—	= <i>Borzicactus icosagonus</i> (Kunth) Britton & Rose
Holotype (flower and flower buds only)	Isotype (flower only)	

continued on next page

P-Bonpl (2) / P <i>Cactus micranthus</i> —	B-W 9433 <i>Cactus variabilis</i> <i>Cactus (variabilis</i> added by Willdenow)	<i>Cactus micranthus</i> Kunth 6: 65 (Peru): prope Olleros Quitensium <i>Rhipsalis micrantha</i> (Kunth) DC.
3494	3494 “(Humboldt)” [Humboldt]	
Olleros	—	
Holotype / isotype (stems)	Isotype (4 stems)	
P-Bonpl (2) / P <i>Cactus micranthus</i> —	B-W 9433 <i>Cactus variabilis</i> <i>Cactus (variabilis</i> added by Willdenow)	<i>Cactus micranthus</i> Kunth 6: 65 (Peru): prope Olleros Quitensium <i>Rhipsalis micrantha</i> (Kunth) DC.
3494	3494 “(Humboldt)” [Humboldt]	
Olleros	—	
Holotype / isotype (stems)	Isotype (4 stems)	
P-Bonpl (1) / — <i>Cactus pendulus</i> Sw. —	B-W 9432-4 <i>Cactus pendulus</i> ” <i>Cactus?</i> ”	<i>Cactus pendulus</i> Sw. 6: 65 (Venezuela): Cocollar, Caripe et San Fernando; (Colombia): juxta Mahates
1538 “(Carthagène) Mahates” — (stems, fruits)	1538 “(Humboldt)” — (4 stems)	<i>Rhipsalis baccifera</i> (J. S. Muell.) Stearn
— / P <i>Cactus phyllanthus alatus</i> —	B-W 9440-2 <i>Cactus phyllanthus</i>	(not treated) — —
1445 “avril 1801, Carthagène, Turbaco” — (stems)	“ <i>Cactus phyllanthus</i> ” 1445 “(Humboldt)” — (stem)	<i>Disocactus amazonicus</i> (K. Schum.) D. R. Hunt ≡ <i>Wittia amazonica</i> K. Schum. ≡ <i>Wittia panamensis</i> Britton & Rose
P-Bonpl (7) / — <i>Cactus sepium</i> —	B-W 9423 <i>Cactus endecagonus</i> —	<i>Cactus sepium</i> Kunth 6: 66 (Ecuador): ad radicem Chimborazi prope Riobamba
3216	— [Humboldt]	<i>Cleistocactus sepium</i> (Kunth) F. A. C. Weber ≡ <i>Borzicactus sepium</i> (Kunth) Britton & Rose
Chimborazo	—	
Holotype (flower only)	Isotype? (flower only)	
P-Bonpl (12) / — <i>Cactus serpens</i> —	— — —	<i>Cactus serpens</i> Kunth 6: 68 (Peru): ad ripas fluvii Guancabambae, prope Sondorillo
3550	—	<i>Cleistocactus serpens</i> (Kunth) F. A. C. Weber
Guancabamba	—	
— (flower only)	—	
P-Bonpl (3) / — <i>Cactus triangularis</i> —	— — —	<i>Cactus triangularis</i> Jacq.(?) 6: 66 (Venezuela and Colombia): Cumana, Carthagena Popayanensium, et in ripa fluminis Magdalenae, juxta Mahates
1884	—	?<i>Hylocereus polyrhizus</i> (F. A. C. Weber) Britton & Rose (specimen)
Mahates	—	?<i>Selenicereus inermis</i> (Otto ex Pfeiff.) Britton & Rose (description)
— (flower parts only)	—	

Acknowledgements

I wish to thank Dr P. Hiepko (Berlin) for information on the Willdenow herbarium and help with the handwritings, Prof. Dr H. W. Lack for calling my attention to Humboldt & Bonpland's *Journal botanique* and for further information on this manuscript, Prof. Dr W. Greuter and Dr U. Eggli (Zürich) for suggestions on the manuscript, Prof. Ph. Morat (Paris) for access to the Humboldt & Bonpland herbarium at Paris, Dr O. Poncy (Paris) for further information on herbarium specimens, and Dr Lorenzo Ramella (Geneva) for literature.

References

- Anderson, E. F. 2001: The cactus family. – Portland
- Backeberg, C. 1931: Neue Kakteen. Jagden, Arten, Kultur. – Frankfurt (Oder).
- Barthlott, W. 1974: Über den *Rhipsalis micrantha* (HBK)DC-Komplex in Ecuador und Peru. – Trop.-Subtrop. Pflanzenwelt **10**: 1-28.
- Brako, L. & Zarucchi, J. L. 1993: Catalogue of the flowering plants and gymnosperms of Peru. – Monogr. Syst. Bot. Missouri Bot. Gard. **45**.
- Britton, N. L. & Rose, J. N. 1920: The *Cactaceae* 2. – Carnegie Inst., Publ. **248**.
- Candolle, A. P. de 1828: *Cactaeae*. – Pp. 457-476 in: Candolle, A. P. de, *Prodromus systematis naturalis regni vegetabilis* **3**. – Paris.
- Crook, R. & Mottram, R. 2001: *Opuntia* index 7. Nomenclatural note and P-Q. – *Bradleya* **19**: 91-116.
- Faak, M. (ed.) 1986: Alexander von Humboldt, Reise auf dem Rio Magdalena durch die Anden und Mexiko. – Beitr. Alexander-von-Humboldt-Forsch. **8**.
- 2000: Alexander von Humboldt, Reise durch Venezuela. Auswahl aus den amerikanischen Reisetagebüchern. – Beitr. Alexander-von-Humboldt-Forsch. **12**.
- Hamy, E. T. 1906: Aimé Bonpland medecin et naturaliste explorateur de l'Amérique du Sud, sa vie, son oeuvre, sa correspondance. – Paris.
- Hiepko, P. (ed.) 1972: Herbarium Willdenow. Alphabetical index. – Zug.
- Holmgren, P., Holmgren, N. H. & Barnett, L. C. 1990: Index herbariorum I. The herbaria of the World, ed. 8. – *Regnum Veg.* **120**.
- Humboldt, A. de, Bonpland, A. & Kunth, C. 1823: Nova genera et species plantarum **6**. – Paris.
- Humboldt & Bonpland Herbarium (microfiche edition), IDC 6209. – Zug.
- Hunt, D. R. 1982: Nomenclature. – *Cact. Succ. J. Gr. Brit.* **44**: 2.
- 1999: CITES *Cactaceae* checklist, ed. 2. – Kew.
- Krapovickas, A. 1970: Historia de la botánica en Corrientes. – *Bol. Soc. Argent. Bot.* **11**, Suppl.: 229-276.
- Kunth, C. S. 1817: *Polygoneae* Juss. – Pp. 175-182 in: Humboldt, A. de, Bonpland, A. & Kunth, C. S., *Nova genera et species plantarum* **2**. – Lutetiae Parisiorum.
- 1823: *Opuntiaceae*. – Pp. 64-70 in: Humboldt, A. de, Bonpland, A. & Kunth, C. S., *Nova genera et species plantarum* **6**. – Paris.
- Lack, H. W. 2001: The plant self impressions prepared by Humboldt and Bonpland in tropical America. – *Curtis's Bot. Mag.*, ser. 6, **18**: 218-229.
- Leuenberger, B. E. 1986: *Pereskia* (*Cactaceae*). – *Mem. New York Bot. Gard.* **41**: 1-141.
- 1987: Über *Pereskia bleo* (Kunth) De Candolle und *Pereskia grandifolia* Haworth. – *Kakteen Sukk.* **38**: 266-269.
- 2002, in press: The misunderstood *Cleistocactus serpens*, and *C. longiserpens*, a new name for a species of *Cactaceae* from Peru. – *Bot. Jahrb. Syst.* **124**(1).
- Lourteig, A. 1977: Aimé Bonpland. – *Bonplandia* **3**: 269-317.
- Madsen, J. 1989: *Cactaceae*. – *Flora of Ecuador* **35**. – Arlöv.
- McVaugh, R. 1955: The American collections of Humboldt and Bonpland as described in the *Systema Vegetabilium* of Roemer and Schultes. – *Taxon* **4**: 78-86.

- Pfeiffer, L. 1837: Enumeratio diagnostica *Cactearum* hucusque cognitarum. – Berolini.
- Rankin Rodríguez, R. & Greuter, W. 2002: Humboldt, Willdenow, and *Polygala* (*Polygalaceae*). – Taxon **50**: 1231-1247.
- Ritter, F. 1981: Kakteen in Südamerika **4**. – Spangenberg.
- Rowley, G. D. 2000: *Akersia* – hail and farewell. – Brit. Cact. Succ. J. **18**: 206-208.
- Salm, J. 1822: Observationes botanicae in horto Dickensi notatae 3. – Coloniae.
- Schumann, K. 1903: *Wittia amazonica* K. Sch. n. gen. et sp. – Monatsschr. Kakteenk. **13**: 117-119.
- Stearn, W. T. (ed.) 1968: Humboldt, Bonpland, Kunth and tropical American botany. – Lehre.
- Trujillo, B. 1997: *Cactaceae*. – Pp. 732-749 in: Berry, P. E., Holst, B. K. & Yatskievych, K. (vol. ed.), Flora of the Venezuelan Guyana **3**. – St. Louis.
- Werdermann, E. 1937: Blühende Kakteen und andere sukkulente Pflanzen 34. – Berlin.
- Willdenow, C. L. (ed.) 1799: Species plantarum, ed. 4. – Berlin.
- Willdenow Herbarium (microfiche edition) IDC 7440. – Zug.
- Winter, H. [undated, 1955]: Kakteen, Cacti, Cactées. Samen - seed - semence. – Frankfurt a. M.
- [undated, 1956]: Kakteen, Cacti, Cactées. Samen - seed - semence. – Frankfurt a. M.

Address of the author:

Dr Beat Ernst Leuenberger, Botanischer Garten und Botanisches Museum Berlin-Dahlem, Freie Universität Berlin, Königin-Luise-Str. 6-8, D-14191 Berlin, Germany; e-mail: b.leuenberger@bgbm.org